SAFE ENERGY E-JOURNAL No.83

September 2019

The content of this e-journal was for the most part originally prepared for Nuclear Free Local Authorities and is reproduced, as adapted, with their permission but without liability for its contents.

This briefing does not necessarily deal with the UK Government's proposed new reactor programme. For an update on developments to do with new reactors see here:
http://www.no2nuclearpower.org.uk/wp/wp-content/uploads/2019/07/NuClearNewsNo118.pdf

1. Hunterston

Reactor 4 (R4) at Hunterston B was re-started on 25th August after EDF's safety case was approved by the Office for Nuclear Regulation (ONR). The reactor was given permission to reopen – but only for about four months (a core burn up of 16.025TWd). R4 has an estimated 209 cracks in its graphite core. It was shut down on 2 October 2018. ONR accepted EDF's argument that it's safe to relax the limit for the permitted number of cracks. The "operational allowance" for cracks per reactor is being doubled from 350 to 700. But ONR stressed that after four months EDF would again have to prove that it was safe to carry on running the reactor. (1)

ONR said it "is satisfied that reactor four is safe to operate for the next period and can be safely shut down in all foreseeable circumstances, including that of a significant seismic event." (2)

Meanwhile, the outage at Reactor 3 has been extended to at least 15th January 2020. R3 has been offline since March 2018. The number of cracks in its graphite core is now up to around 370 cracks. EDF says that after discussions with ONR, it needs to do some additional technical analysis to support the Reactor 3 safety case assessment which will take about six weeks. (3)

EDF Energy is currently examining three incidents that took place between April and June, in cooperation with the ONR. The incidents included cooling for a reactor being temporarily lost, a shutdown pump failing and smoke coming from a control room panel. EDF is also investigating a fourth incident from earlier in the year when a power failure prevented cooling gas from being circulated around a reactor. These incidents have just come to light in the latest safety reports on Hunterston B published by the ONR. Whilst there were no radiological consequences from them, this is largely due to the reactors not being in operation. A loss of cooling is of real concern as the consequences of such an eventuality when the reactors are in full operation could have been extremely serious. (4)

Scottish Greens MSP Ross Greer raised concerns over these previous safety incidents, described by EDF Energy as minor. The politician said these combined with the cracks "paint the picture of an ageing relic being pushed beyond its already repeatedly extended lifespan". Friends of the Earth Scotland director Richard Dixon said: "Restarting the Hunterston reactors is definitely not worth the

risk. Most people in Scotland will not even have noticed these reactors at Hunterston have been offline for so long as dependable renewable energy has more than made up for the difference." (5)

Scottish CND has called for free potassium iodate tablets to be pre-distributed to the population within 30 miles of Hunterston. (6)

At a meeting held between NFLA and ONR in July, while it was still considering the R4 safety case, an issue recently identified was raised - the widening of some of the cracks in graphite blocks. This has prompted the need for further analysis of the significance of crack openings greater than 1.2 cm wide (i.e. around ½ inch), a small number of which are predicted to occur in the next period of operation.

A useful part of the meeting was to discuss an approach EDF was developing to define 'End of Life' criteria for the AGR reactors, in other words, the maximum levels of core degradation that can be demonstrated to be safe, whilst leaving a significant margin of safety. Such criteria would need to be fully agreed by ONR. These included not only the number of cracked bricks, but also their sizes (i.e. how wide they were) and also the numbers and locations of multiply-cracked barrels (i.e. barrels with 3 or 4 cracks or more stretching from top to bottom). In ONR's view, these latter issues were likely to be more important than the numbers of cracked barrels. The most important factor was for EDF to demonstrate to ONR that all 81 control rods could be inserted unimpeded, even in a 1 in 10,000 year seismic event.

Hunterston SSG

At the Hunterston Site Stakeholder Group meeting held on 5th September a presentation was given by Jane McGeorge of Civil Contingencies Unit at North Ayrshire Council on the duties placed on EDF Energy and North Ayrshire Council' by REPPIR 2019. This has to be implemented by 22nd May 2020. EDF will have to produce a 'Consequence Report' by 22nd Sept 2019. This will be made available to the public as soon as possible. This will be used to review the Detailed Emergency Planning Zone (DEPZ) which is currently 2.4km. Two months after the Consequence Report is produced NAC will need to decide on whether to extend the DEPZ or not. But it shouldn't necessarily be assumed that the zone will increase in size.

The current Off-Site Contingency Plan (Redacted) is available here: https://www.north-ayrshire.gov.uk/Documents/CorporateServices/ChiefExecutive/hunterston-off-site-plan.pdf

The Outline Planning Zone will be increased from 20km to 30km. Planning in this zone is restricted to generic plans. With the larger OPZ there will have to be more liaison with adjacent authorities. (incl. Renfrewshire and East Renfrewshire Councils)

There are thought to be only 13 families with pre-distributed potassium iodate (KI) tablets. And we don't know whether it is feasible to distribute them further in an emergency. The emergency telephone alert system is voluntary for people in the DEPZ. Calls, at the meeting, for sirens to be considered appeared to fall on deaf ears.

Cllr Ian Murdoch – an independent councillor who is not a member of the SSG – said given that the reactors are very old – 13 years past design life - and racked – should we not be beefing up the

emergency plan. ONR responded (much to the surprise of members of the public attending) saying that approval of the safety case indicated that the risk has not been increased by the occurrence of cracks. Ian Murdoch said “tell that to the members of the public”.

Councillor Ian Murdoch had earlier taken issue with Largs Community Councillor Drew Cochrane for claiming that local people who aired their concerns about safety at Hunterston to the elected member in confidence were ‘non-existent’. Cllr Murdoch responded: “I can state categorically that people are frightened and have approached me asking if I can inform them as to what is actually happening at Hunterston B.” (7)

Meanwhile, Magnox is looking at leaving some of the Low Level Waste (LLW) on the Hunterston A site. There is a plan to put a strategy paper to the NDA in December this year. One example given of the type of waste was the actual concrete bunkers – after the waste has been removed – which could be left in situ. No waste would be imported. The waste would mostly be rubble. Rita asked about the VLLW buried in pits on the beach. The reply was that it would have to be characterised before any decision are made.

SEPA is looking at a variation in the permit which has been requested for waste facilities. There will be no increase in discharge limits, so there may be no consultation process. There will be two new stacks – one for the ILW store and one for the Solid ILW Encapsulation Plant.

John McNamara from the NDA said that next year’s stakeholder summit will be held in Scotland.

---

1. ONR Project Assessment Report, August 2019 http://www.onr.org.uk/pars/2019/hunterston-b-19-004.pdf and EDF Energy 20th August 2019 https://www.edfenergy.com/media-centre/news-releases/community-update-13
2. The Ferret 20th Aug 2019 https://theferret.scot/cracked-reactor-hunterston-restart/
3. Energy Live News 5th Sept 2019 https://www.energylivenews.com/2019/09/05/restart-delayed-of-scottish-nuclear-reactor-where-cracks-were-found/
4. NFLA Press Release 6th Aug 2019 http://www.nuclearpolicy.info/news/nfla-concerns-reopening-hunterston-b-reactor/ and The Ferret 2nd Aug 2019 https://theferret.scot/hunterston-nuclear-plant-four-safety-incidents/
5. Energy Voice 21st Aug 2019 https://www.energyvoice.com/other-news/205895/hunterston-nuclear-plant-to-temporarily-return-to-service/
6. Herald 23rd Aug 2019 https://www.heraldscotland.com/news/17855081.demand-distribute-nuclear-emergency-tablets-hunterston-reactor-re-opens/
7. Largs and Millport News 28th Aug 2019 https://www.largsandmillportnews.com/news/17848378.war-words-hunterston-power-station-continues/

2. Dounreay

An investigation has been launched after a lightning strike, on 17th June, knocked out power at Dounreay and its back-up supplies also failed. It meant that for about one hour there was no power for vital safety systems which monitor radiation and ventilation. The lightning strike was not a "direct hit" on the facility but somewhere else on the local network. Nuclear regulators said they believed "adequate contingency arrangements" were in place at the site and that it was "satisfied that these were implemented effectively". But Scottish Greens MSP John Finnie said such incidents could have serious consequences. It is understood that once the DSRL investigation into the lightning strike has been completed, the ONR will review the evidence and then decide if follow-up action is required.

It was the second safety issue at the site in the space of 10 days, after radiological contamination was found on the hand and shoe of a worker at the plant near Thurso on June 7. Work was temporarily halted at Dounreay after the discovery, although the levels of contamination detected were found to be "very low". (See below) (1)

It was confirmed in May that the transfer of 700kg of highly enriched uranium (HEU) from Dounreay to the US had been completed. This was seen as an important milestone in the clean-up of the site. Shipments of fuel containing HEU and plutonium to Sellafield are due to end in the next 12 months. Some of the greatest engineering challenges, however, still lie ahead. Not least dealing with the notorious Dounreay Shaft, where nuclear and chemical waste was dumped along with other items. In 1977 an explosion meant the shaft had to be sealed. Official estimates hold it could be another 300 years before the Dounreay site is free from radioactive contamination and safe for "unrestricted use". The seabed immediately offshore may never recover from contamination by radioactive particles. (2)

Work to retrieve the radioactive waste from the shaft isn't expected to start for another three or four years. Preparatory and construction work have to be carried out before the waste can be removed. The contract to clear out the shaft is one of six worth up to an estimated £400 million which were announced earlier this year as part of the decommissioning of the site. They also include removing radioactive waste disposed in the silo. (3)

Low Level Waste

The Scottish Environment Protection Agency (SEPA) has published the finalised version of its nuclear sector plan. The plan presents SEPA's vision for the sector. This includes reusing and recycling waste materials from nuclear power generation and decommissioning wherever possible. (4)

The NFLA response to the consultation on the draft of the SEPA Nuclear Sector Plan was critical of this approach believing that it involves diluting and dispersing radioactivity which should instead be concentrated and contained. (5)

It is an environmental and economic success story that (non-radioactive) metal and other materials are recycled and reused to prevent unnecessary mining and extraction of new materials from the Earth. But the nuclear power and weapons industries, their government promoters and so-called

"regulators" and the international radiation establishment are threatening this success by sending radioactive metal and other materials into the mix. The nuclear industry is shifting its waste liability to the steel industry, the most successful recycling industry in the world. The Steel Manufacturers Association said in its 2009-2010 Policy Statement. (6)

Dounreay Site Restoration Limited (DSRL), a company owned by Cavendish Dounreay Partnership, has teamed up with EDF Cyclife and Low Level Waste Repository Ltd (LLWR) to transport 4 large objects, weighing a total of 66 tonnes, to a specialist facility for so-called 'recycling'. (The NDA Press Release doesn't say whether it went to the Cyclife plant at Lillyhall in Cumbria or Nykoping in Sweden)

It was part of a feasibility study considering a different low level waste metal treatment route for recycling bulk metal items, rather than disposing of them in the Dounreay low level waste vaults. The work is being co-ordinated by LLWR on behalf of Nuclear Decommissioning Authority (NDA), which aims to reduce the amount of low level waste material sent for disposal. It builds on similar projects delivered elsewhere in the NDA group, such as at Berkeley in Gloucestershire and Chapelcross in Dumfries. (7)

The NDA says this "opens the door to future possibilities". Sam Usher, Dounreay's Strategic Programme Director said: "Working with EDF Cyclife and LLWR, we have used a new route to recycle large items, too big to fit inside standard waste containers, rather than size reducing and disposing of them in vaults. This is a major step forward for the site and has enormous potential for our future decommissioning strategy." (8)

- The discovery of a measurable level of radioactive americium – a so-called daughter of plutonium – on the Dounreay foreshore in December 2016 was a first and was the subject of prolonged analysis by the Government appointed Dounreay Particles Advisory Group. DPAG has now concluded that it did not pose a significant risk to human health. SEPA said the area of the beach where it was found is not easily accessed by the public. (9)
- The MoD says that community representatives in Caithness will be fully consulted over the wind-down of the Vulcan naval submarine test reactor. Vulcan, which is next door to Dounreay, has been in rundown mode since its pressurised water reactor was shut down in 2015. The Dounreay Site Stakeholder Group has been concerned about undue secrecy regarding plans to decommission the site. (10)
- Dounreay was evacuated after radioactive contamination was detected on 7th June. (11) The alarm was sounded as a worker sought to leave a former reprocessing plant in the fuel cycle area. After surveys identified further hotspots in the plant, all personnel were moved out. (12)
- Peter Faccenda has been welcomed into the role of Caithness and North Sutherland Regeneration Partnership manager. CNSRP partners are committed to continuing the work to move the area economy away from its dependence on Dounreay decommissioning, which has resulted in around 1400 full-time equivalent jobs being either created or retained in the Dounreay travel-to-work area. "We estimate that a

further 1300 full-time jobs could be possible by 2030, which will continue to support population growth in the area." (13)

- The north coast of Caithness and Sutherland could have "significant opportunities" in floating offshore wind developments over the next 10 years, Eann Sinclair, Highlands and Islands Enterprise's north area manager, told Thurso and Wick Trade Union Council. (14)

1. Press & Journal 22nd Aug 2019 https://www.pressandjournal.co.uk/fp/news/highlands/1824279/exclusive-investigation-launched-after-lightning-strike-causes-loss-of-power-at-dounreay/
2. Energy Voice 28th May 2019 https://www.energyvoice.com/opinion/200202/dounreay-clean-up-challenge-remains/
3. John O'Groat Journal 7th Sept 2019 https://www.johnogroat-journal.co.uk/news/timescale-outlined-for-dounreay-shaft-work-182669/
4. SEPA 16th May 2019 https://sectors.sepa.org.uk/nuclear-power-generation-and-decommissioning-sector-plan/
5. NFLA 8th February 2019 http://www.nuclearpolicy.info/wp/wp-content/uploads/2019/02/Rad_Waste_Brfg_75_Scottish_Nuclear_Sector_Plan.pdf
6. See WISE Nuclear Monitor 5th March 2012 https://wiseinternational.org/nuclear-monitor/743/help-stop-radioactive-poisoning-recycling-again
7. NDA 14th May 2019 https://www.gov.uk/government/news/dounreay-recycling-trial-opens-doors-for-future-possibilities
8. Energy Live News 14th May 2019 https://www.energylivenews.com/2019/05/14/dounreay-recycles-metal-waste-from-nuclear-site/
9. Press and Journal 6th Sept 2019 https://www.pressandjournal.co.uk/fp/news/highlands/1836230/radioactive-particle-found-at-dounreay-foreshore-deemed-not-a-significant-risk/
10. Press and Journal 19th July 2019 https://www.pressandjournal.co.uk/fp/news/highlands/1799728/community-representatives-to-be-consulted-over-caithness-naval-test-base-wind-down/
11. John O Groat Journal 28th June 2019 https://www.johnogroat-journal.co.uk/news/dounreay-contamination-incident-revealed-at-meeting-179828/
12. Press & Journal 27th June 2019 https://www.pressandjournal.co.uk/fp/news/highlands/1783601/workers-evacuated-from-former-nuclear-power-station-in-the-highlands-after-radioactive-contamination-discovered/
13. John O Groat Journal 11th June 2019 https://www.johnogroat-journal.co.uk/news/new-manager-says-its-an-exciting-time-to-take-on-regeneration-partnership-role-179094/
14. John O Groat Journal 7th June 2019 https://www.johnogroat-journal.co.uk/news/north-coast-potential-for-floating-offshore-wind-highlighted-178936/

3. Scotland's Climate Change Programme

Programme for Government

Environmental campaigners have welcomed commitments in the Scottish Government's Programme for Government (PfG), launched at the beginning of September. However they also emphasised that they don't go nearly far enough to truly tackle the climate crisis.

The PfG includes a pledge to ensure that, by 2024, all new homes must use renewable or low-carbon heat. It also says the transition to net-zero emissions will be at the heart of the Scottish National Investment Bank's work. There will be a £17m fund to support the demand for ultra-low emission vehicles and an expansion of the Low Carbon Transport Loan Scheme to include electric vehicles. The Scottish Government said it would seek to unlock additional resources for emissions-reducing investment through a Green Growth Accelerator combining public and private investment to transform cities and regions and would bring forward a £3 billion portfolio of projects, including renewables, waste and construction, ready for green finance investment.

The legislative programme also includes pledges to: achieve zero emissions from Highland and Islands Airports Limited's operations, with trials set to begin on low or zero-emission flights in 2021. There is also a pledge to reduce emissions from Scotland's railways to zero by 2035 through the continued electrification of the network, the procurement of battery-powered trains and exploration of the potential of hydrogen-powered trains in Scotland. There will also be support for people to gain the skills they need to carry out this work through a Climate Emergency Skills Action Plan.

There will also be a review of the idea of banning fossil fuel cars in city centres by 2030 and more investment in cleaner buses, and a commitment to raise bus usage. (1)

Friends of the Earth Scotland Director, Dr Richard Dixon, said: "The Climate Emergency should signal a radical change of direction, especially when it comes to planning the end of oil and gas extraction from the North Sea. Instead we heard of an increased focus on Carbon Capture and Storage and hydrogen, both dangerous distractions, which risk prolonging that industry and taking the focus away from real, sustainable solutions to the climate crisis." He says support for Carbon Capture and Storage, will prolong the life of the oil industry, and waste the Scottish National Investment Bank's time and money. (2)

Climate Change Targets

The Scottish Government has lodged amendments to the Climate Change Bill which will set a legally binding target of net-zero greenhouse gas emissions by 2045 at the latest after accepting the recommendations of the Climate Change Committee (CCC). (3) The target for 2030 would be set at 70% and for 2040 at 90%. (4)

Friends of the Earth Scotland points out that a target for 2030 is more important than 2050 because it requires policies to be enacted now to reduce emissions over the next decade. (5) The Scottish Government's target for by 2030 has only been increased by 4%. The CCC says it reached the new 70% figure by simply drawing a straight line between now and 2045, claiming that there was not

enough data available to go into more detail within the legislative timetable. The advice may change next year. Professor Kevin Anderson, one of the UK's leading climate change experts, has called for a much more robust target for Scotland for 2030 of 86%. (6)

Environment, Climate Change & Land Reform Committee

The Scottish Parliament's Environment, Climate Change and Land Reform Committee took evidence from CCC Chief Executive Chris Stark and others in May.

In terms of policy, to reach the 2045 net zero target, CCC wants to see as much action as possible as soon as possible, such as bringing forward the EV target date to 2030; starting afforestation immediately; and CCS clusters established in the next 5 years.

Despite previous experience the CCC still forecasts a doubling of electricity demand, yet during the evidence session neither energy efficiency nor district heating systems were mentioned. Asked what role nuclear plays in CCC scenarios given the difficulties in deploying new nuclear, Chris Stark said we need a system that works. There are limits to how far renewables can go unless they are paired with other technologies. CCC has been cautious and looked at a 60% penetration of renewables. It thinks we can probably go further. There has to be a mixture of things to provide the flexibility we need to manage that kind of penetration. This would include either nuclear or CCS. Nuclear may well have a role but it needs to be at a price that the market can deliver. CCC is agnostic about technology but not the price at which it is developed. If nuclear is to play a part in the mix by 2050 then it is going to have to do so in competition with other technologies. Clearly you can get emissions down with different mixes of technologies. You could have more or less nuclear than `we have assumed and still get to the same level of emissions.

On low carbon heating, Scotland has to get from 4.5% renewable to 90% by 2050. It is not going to be easy to get off gas. We don't have a strategy across the UK to deliver decarbonised heating and there are big choices to be made. The key message from CCC is you have no excuse not to make a plan now. Key choices include what do we do about the gas grid; can we use hydrogen? CCC leans heavily towards electrification using heat pumps; it is perfectly possible to have a mixture of outcomes.

CCC says we need a UK Strategy by 2020. BEIS is putting together a strategy for after the Renewable Heat Incentive (RHI) runs out, but the plan has to be much more than that. One of the key components has to be the penalty against electric heating and incentive to use gas. This imbalance has to be addressed in the review CCC has suggested is carried out by The Treasury. Treasury will also have to consider how to replace vehicle fuel tax and it can't keep loading costs onto electricity consumers.

On oil and gas extraction, CCC says it can envisage continuing oil and gas extraction in Scotland, because hydrogen will have to be made from natural gas with CCS, and oil will be needed for chemicals.

Chris Stark reflected that the arguments after the publication of this report have not been with Nigel Lawson, but have been with Extinction Rebellion about whether they are going fast enough. (7)

Government response

Meanwhile, Roseanna Cunningham said: households across Scotland should expect their lives to change significantly - people changing their behaviour would be "critical" for the country to have any chance of ending its contribution to global warming within 25 years. The Scottish Government is planning a consultation to run over the summer, allowing the public to have their say on the emission reduction plans and how individuals can play their part. Ms Cunningham also said climate change would be placed at the centre of the Scottish Government's coming legislative plans and its Budget for 2020-21. (8)

Appearing before the parliamentary committee herself, Roseanna Cunningham said UK government policies could "inhibit" Scotland from reaching its climate change target. She said Westminster has to take decisions in reserved areas to enable Scotland to hit its proposed target of net-zero carbon emissions by 2045. She criticised current UK government plans, including a VAT rise on some types of renewable energy, as discouraging people to do their bit to fight climate change. (9)

On the Just Transition Commission the Cabinet Secretary said it was set up to last for two years, initially, but when the commission reports to Government after the two years, "we will consider the best way to take forward the just transition issue. We are not saying that the only way to do that is by creating a statutory body. It is important that there are strong arguments and a clear rationale for the Government setting up a statutory body, and that those aims cannot be met in any other way. That is not clear yet." (10)

> Meanwhile the Scottish Government's public consultation on how to combat the global climate emergency has been condemned as "fiddling while the world burns". The inaugural meeting of ministers' much-vaunted "big climate conversation" in Glasgow on July 16 faced a tirade of public criticism from participants frustrated by its "closed questions and narrow focus". When organisers, Keep Scotland Beautiful (KSB), asked at the meeting whether the questions were too narrowly framed, almost all of the 65 people present put up their hands to agree. In response, KSB said it would review the format. The big climate conversation was announced by First Minister Nicola Sturgeon on June 19 to discuss action "to tackle the global climate emergency". (11)

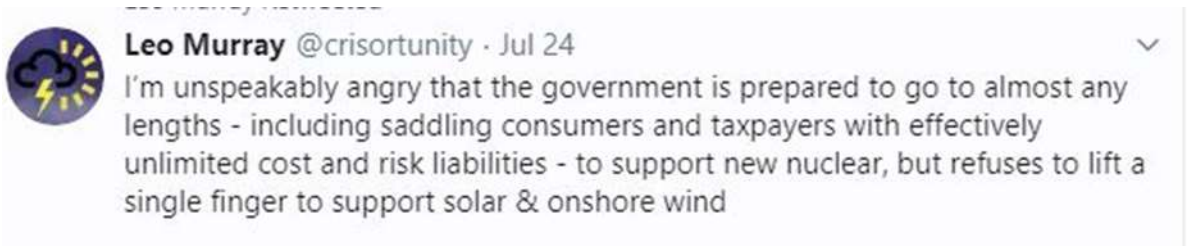
1. Edie 4th Sept 2019 https://www.edie.net/news/11/Scottish-government-unveils-swathe-of-green-initiatives/
2. FoE Scotland 3rd Sept 2019 https://foe.scot/press-release/climate-emergency-programme-for-government-fails-make-grade-scot-pfg/
3. The National 2nd May 2019 https://www.thenational.scot/news/17611722.scotland-unveils-blueprint-forclimate-revolution-with-warning-to-uk/
4. Times 2nd May 2019 https://www.thetimes.co.uk/article/e7ddcc9e-6c59-11e9-bf02-7f5aa383779f
5. BBC 4th March 2019 https://www.bbc.co.uk/news/uk-scotland-scotland-politics-47415764
6. New Statesman 24th June 2019 https://www.newstatesman.com/politics/scotland/2019/06/how-extinction-rebellion-s-holyrood-rebel-camp-exposed-snp-s-lack

7. Environment, Climate Change and Land Reform Committee Meeting 14th May 2019 https://www.youtube.com/watch?v=NecIetfAUgc&feature=youtu.be
8. Scotsman 14th May 2019 https://www.scotsman.com/news/politics/scottish-minister-demands-national-endeavour-on-climate-crisis-1-4927068 and The i News 14th May 2019 https://inews.co.uk/news/scotland/expect-your-lives-as-we-tackle-climate-change-says-environment-secretary/
9. Scotsman 22nd May 2019 https://www.scotsman.com/news/politics/westminster-could-inhibit-scotland-from-hitting-climate-change-targets-1-4931949
10. Official report of the Environment, Climate Change and Land Reform Committee 21st May 2019 http://www.parliament.scot/parliamentarybusiness/report.aspx?r=12114
11. The Ferret 21st July 2019 https://theferret.scot/big-climate-conversation-scottish-government/

4. New Nuclear State of Play

Hinkley Point C has completed what is being described as "its biggest milestone" so far with the pouring of concrete for the base for the first of two nuclear reactors. This will pave the way for the construction of the nuclear buildings above ground. The final 9,000m³ of concrete poured onto the base was the largest concrete pour in the UK – more than the record set by the Shard in London. (1)

Meanwhile the UK Government has launched an initiative to revive the moribund new build programme which involves all consumers – including Scottish ones – paying to subsidise their construction. It confirmed its intention to go ahead with plans to charge electricity consumers for new nuclear reactors before they are built, and for taxpayers to pay a share of any cost overruns or construction delays. This 'nuclear tax' will apply to all electricity consumers even if they have chosen a 100% renewable tariff or live in Scotland. Leo Murray - co-founder and director of strategy at carbon cutting campaign 10:10 – tweeted:



In the consultation document launched in the week before the summer recess, officials said the model is "essential" to attract private investors to back the UK's new nuclear ambitions at a price that is affordable for bill payers. The public purse would also compensate nuclear investors if the project was scrapped. The new funding structure could be used to prop up EDF Energy's £16bn plans for Sizewell C and to resurrect the dormant plans for Wylfa Newydd.

The hope is that the "regulated asset base", or RAB model, will make major infrastructure projects cheaper by shifting the risk of spiralling costs from the developer to the taxpayer. Under the model, the developer would receive a regulated price to give it a return on its investment expenditure,

including during the construction period, and this would be levied on energy bills. In the case of an extreme overrun, the government - effectively the taxpayer - could either have to step in and pay the extra cost or scrap the project and pay compensation to investors. The Government says its assessment of the RAB model has concluded that it has the potential to reduce the cost of raising private finance for new nuclear projects, thereby reducing consumer bills and maximising value for money for consumers and taxpayers. (2)

Proposed Nuclear Station	Technology Proposed	Developer	Construction start expected	Commercial operation forecast
Hinkley Point C	2 x 1600MW EPRs	EDF 66.5% CGN 33.5%	First concrete 2019	End of 2025 with risk of 15 month delay
Wylfa Newydd	2 x 1350MW ABWRs	Horizon Nuclear Power – wholly owned subsidiary of Hitachi, Ltd	Work suspended January 2019	Not Known
Moorside	3 x 1150MW AP1000s (but could be replaced by 2 x 1400MW APR1400)	NuGen (currently owned by Toshiba – but a deal to sell it to KEPCO has fallen through)	Plans scrapped NuGen being wound up	Not Known
Sizewell C	2 x 1600MW EPRs	EDF 80% CGN 20%	2021 (4th public consultation just started)	2031
Oldbury B	2 x 1350MW ABWRs	Horizon Nuclear Power – wholly owned subsidiary of Hitachi, Ltd.	Work suspended Jan 2019	Not known
Bradwell B	2 x 1000MW UK HPR1000	CGN 66.5% EDF 33.5%	No defined timeline; began GDA process in Jan 2017	

Greenpeace UK's chief scientist Dr Doug Parr said: "*The nuclear industry has gone in just ten years from saying they need no subsidies to asking bill payers to fork out for expensive power plants that don't even exist yet and may never. This 'nuclear tax' won't lower energy bills – it will simply shift the liability for something going wrong from nuclear firms to consumers. Greg Clark himself has acknowledged that nuclear is being outcompeted by renewables. If ministers want affordable and clean energy, the fastest, safest and cheapest way to do that is to boost renewables like wind and solar*."

RAB financing is more usually applied to projects where there is a natural monopoly, such as the Thames Tideway where Thames Water is a monopoly provider of water and sewage services to the ratepayers who bear the burden of the additional cost. Applying a RAB to a specific project in a competitive market raises difficulties with the need to ensure that only those ratepayers who would benefit from the additional cost of a nuclear RAB would incur the additional cost. It will be difficult, for instance, to explain to consumers in Scotland and those on non-nuclear green tariffs why they are being compelled to pay an additional cost for generating capacity that offers them no benefit.

Even if an assurance of minimal risk to investors is offered, it is not clear whether the investors targeted, for example, pension funds, sovereign wealth funds and investment funds, will be willing to invest the huge sums required. Such investors have never invested in nuclear projects so the RAB model may fail simply due to lack of investors. The new funding model won't make any difference to the construction and operation record of nuclear reactors around the world, and the record of EPRs in particular is abysmal. Nor will it change the fact that nuclear vendors are in financial disarray. (3)

UK needs up to 40GW of non-intermittent power

During the launch of the RAB proposals former Business Secretary Greg Clark disclosed, to industry at a private meeting, estimates of the amount of firm power he thinks will be needed in 2050. He said Britain needs to build a fleet of nuclear or carbon-capture power plants equivalent to a dozen Hinkley Point Cs - up to 40GW of non-intermittent low carbon power stations to hit climate change targets. (4) On the other hand a growing number of studies suggest that with flexibility and ever cheaper renewables it is perfectly possible to run our energy system on 100% renewables.

Unfortunately, the government's justification appears to rest on model simulations run internally, which have not been published. The lack of transparency makes this analysis impossible to judge, says Michael Liebreich, founder of and now senior contributor to Bloomberg New Energy Finance. He told Carbon Brief:

"Any case for 'firm' power is essentially valueless without knowing the detail of the assumptions. Firm power which cannot be switched off when you don't need it will be as much of a problem as variable power which cannot be switched on when you do. What is called for is flexibility, in huge quantities and of all types. Does the nuclear power in the government model provide it? We just aren't told." (5)

Dave Elliott, emeritus professor of technology policy at the Open University, says biogas and green syngas-fired plants would avoid the need for costly CCS, and storable hydrogen syngas could be made from the occasional surplus renewable power outputs, via Power to Gas (P2G) electrolysis, maybe soon at reasonable overall costs — as renewable costs fall, the economics of P2G/hydrogen do seem to be improving. (6)

The BEIS analysis seems to be broadly supported by recent Committee on Climate Change (CCC) advice. The CCC says you can only go so far with the proportion of our energy supplied by renewables before costs start to rise. Yet the CCC doesn't have a good record of estimating future energy costs. (7) Back in 2008, it estimated that offshore and onshore wind costs would to be around £88/MWh and £76/MWh, respectively, by 2020 (expressed in 2008 prices). And it suggested

that the potential for emissions reductions from solar PV was 'very small' within the first three budget periods, because of the high cost. In fact offshore wind generation dropped to under £65/MWh in 2017, and onshore wind would be around £46/MWh and the cost of installing new solar PV capacity is now around £56/MWh. It currently expects to see nuclear costs fall by 28% by 2050, which given past experience seems highly unlikely.

The other thing which the CCC has been bad at forecasting is electricity demand. In 2008 it expected that electricity demand would continue to increase overall, but demand has actually dropped. The CCC now expects a doubling of demand by 2050 due to extensive electrification of heat and transport. The 2005 Energy White Paper was expecting that by 2020 electricity consumption would have increased by 15%. In reality it has decreased by 16%. Nowadays primary energy demand is expected to continue falling by a further 11% by 2025. But after that projections revert to the bad old days. Within ten years Government forecasters expect consumption to be 2% more than today.

The BEIS assertion that up to 40GW of firm power will be "required" by 2050 is also at odds with the views of the National Infrastructure Commission (NIC), which said last year that a focus on renewables "looks like a safer bet than constructing multiple new nuclear plants". The NIC also gave short shrift to small nuclear plants ("their benefits remain speculative") and CCS in the power sector ("unlikely to form part of a cost competitive generation mix"). (8)

As Doug Parr, Chief Scientist at Greenpeace, points out there are a number of studies which show that a 100% renewable energy system is deliverable. The myth that a very high level of renewables can't be integrated into the electric grid is being demolished by the clean tech and battery storage revolution. An article published in Energy in May found that 180 studies on 100% had been published since 2004. The authors of that paper say that six months later the number ha\s jumped to 280. (9)

The GB electricity system operator has suggested demand-side response (DSR) is more reliable than nuclear power. The reliability of the UK nuclear fleet recently has been poor whereas the performance of so-called "aggregators" who pull together various different ways to cut demand at peak periods has been superior. (10)

- Many of the articles and reports about electric vehicles assume that car numbers in an electric future will remain at about 35million. But car use will still need to be curbed to address issues like traffic jams, urban sprawl and wasted space for parking. And, as well as the problem of obtaining enough cobalt, EV's won't offer a complete solution to air pollution problems because of particulate pollution from brakes and tyres. We are still going to have to transfor our cities to make them more cycle and pedestrian-friendly. (11) Cycling champion Chris Boardman says EVs are one of the biggest threats to solving congestion, pollution and obesity. We need to give people viable and attractive options to get out of the car, not a different type of car. (12)

EPRs – a disaster we must not repeat

Meanwhile, EDF has announced that the EPR being built in Flamanville in Normandy will be delayed by at least three years, until the end of 2022 due to problems with weldings. This is certain to push

up costs project costs that have already exploded to €10.9 billion. The latest delay comes after the French Nuclear Safety Authority ordered EDF to repair eight faulty welds at the plant. When construction started in 2007 the original completion date was 2012, at a cost of €3.3 billion, which means the plant will be at least a decade late and €7.6 billion over budget. (13)

Olkiluoto in Finland, has proved a similar disaster with commissioning of the EPR delayed again by another six months to July 2020. Construction began in August 2005 and is about nine years behind schedule with cost overruns running at around €6 billion. (14)

Two EPRs are operating in China. Construction of Taishan-1 began in November 2009 and began commercial operation on 13 December 2018. Construction of Taishan 2 began in April 2010. It achieved first criticality on 28 May 2019. It reached full generating capacity for the first time in August and has now entered commercial operation later this year. Both suffered delays of up to two years. (15)

- The German Institute for Economic Research (DIW), says the military have always been the driving force behind nuclear power construction. The report - 'High-Priced and Dangerous: Nuclear Power is not an option for the Climate-Friendly Energy Mix' - analyses the 674 nuclear power plants built since the 1950s. On average they make a loss of €5 billion (US$5.6 bn) each, and that is without taking into account the cost of getting rid of their radioactive waste. Looking forward the researchers conclude that SMRs too are doomed to be an expensive failure. (16)

1. Somerset Live 28th June 2019 https://www.somersetlive.co.uk/news/somerset-news/hinkley-point-c-base-completed-3025912
2. BEIS 23rd July 2019 https://www.gov.uk/government/consultations/regulated-asset-base-rab-model-for-nuclear
3. Written evidence submitted to the BEIS Committee by Professor Steve Thomas, Tom Burke CBE & Dr Paul Dorfman (FEI004) Is there a 'giant hole' in UK energy policy? http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/business-energy-and-industrial-strategy-committee/financing-energy-infrastructure/written/98710.pdf
4. Times 24th July 2019 https://www.thetimes.co.uk/article/142efc8a-ad84-11e9-b657-11944f524f2a
5. Carbon Brief 26th July 2019 https://www.carbonbrief.org/analysis-does-the-uk-require-new-nuclear-to-reach-net-zero-emissions
6. Physics World 7th Aug 2019 https://physicsworld.com/a/does-the-uk-need-40-gw-of-firm-capacity/
7. ECIU 16th July 2019 https://eciu.net/blog/2019/decarbonisation-is-getting-cheaper-why
8. Carbon Brief 10th July 2018 https://www.carbonbrief.org/in-depth-uk-can-go-low-carbon-at-no-extra-cost-say-infrastructure-advisors
9. Energy 15th May 2019 https://www.sciencedirect.com/science/article/abs/pii/S0360544219304967
10. The Energyst 18th July 2019 https://theenergyst.com/national-grid-dsr-more-reliable-than-nuclear/

11. See nuClear News No.118 for more on this. http://www.no2nuclearpower.org.uk/wp/wp-content/uploads/2019/07/NuClearNewsNo118.pdf
12. Times 29th July 2019 https://www.thetimes.co.uk/edition/news/electric-cars-are-a-threat-to-clean-air-claims-chris-boardman-hhqzhvxz0
13. Times 27th July 2019 https://www.thetimes.co.uk/article/5268801e-afd9-11e9-84cf-31ddba0e0fae
14. Nucnet 10th April 2019 https://www.nucnet.org/news/finland-s-tvo-announces-further-delay-to-olkiluoto-3-epr-project & Nucnet 17th July 2019 https://www.nucnet.org/news/commercial-operation-delayed-six-months-to-july-2020-7-3-2019
15. Nucnet 1st July 2019 https://www.nucnet.org/news/taishan-2-epr-connected-to-grid-says-framatome-7-1-2019
16. Climate News Network 6th Aug 2019 https://climatenewsnetwork.net/nuclear-power-somehow-always-makes-a-loss/

5. Small Modular Reactors (SMRs)

A report from the Royal Society of Edinburgh (RSE) (1) has suggested that Scotland should consider building an array of small nuclear power reactors to help combat climate change. This has been dismissed as “disingenuous” by the Nuclear Consulting Group think tank saying that RSE’s report has displayed a “disappointingly poor grasp of the realities of the nuclear issue”.

The RSE warns against ruling out energy technologies that may not meet “every possible criterion”. The nuclear power industry welcomed RSE’s report which followed a two-year inquiry. Its lead authors were Sir Muir Russell, who was head of the Scottish civil service and principal of the University of Glasgow, and Rebecca Lunn, an engineering professor at the University of Strathclyde.

“Nuclear power has zero carbon emissions at point of generation and could play a major role in helping Scotland meet its climate targets,” the report concluded. It accepted that there were “well recognised challenges” with nuclear such as costs, decommissioning, and the disposal of radioactive waste. “Addressing these issues will require substantial investment over a prolonged period of time,” it said.

But the RSE report suggested that “small modular reactors” (SMRs) could be a solution. They are reactors designed to be assembled from pre-made parts to generate under 300 megawatts of electricity, a quarter of that produced by current nuclear stations. “SMRs could provide many of the benefits of large-scale nuclear energy, but in a form that may prove more acceptable to the public,” the report said.

The Nuclear Consulting Group (NCG) has now issued a sharp riposte to the RSE report. It has published a paper by three experts: Dr Paul Dorfman from University College London; Tom Burke from the climate think tank E3G; and Steve Thomas, emeritus professor of energy policy from the University of Greenwich. They concluded that “Scotland’s energy future has no need for nuclear”. They criticised the RSE report for “conflicting” and “confusing” messages about nuclear power. The RSE report didn’t provide evidence to back up some of its claims, the NCG paper argued. The RSE

failed “to note that all nuclear is significantly more carbon intensive than all renewables”. NCG maintained that renewables such as wind power were cheaper than new nuclear. It was particularly critical of the idea that SMRs could help Scotland achieve its climate targets. (2)

Councillor Feargal Dalton, Convener of the Nuclear Free Local Authorities Scotland Forum, responded to the RSE report saying we can all agree that we do not have very long to respond to the climate emergency, and there is only so much money for the project given other challenges to the public purse. But it is clear that while the costs of renewables continue to come down year on year, the costs of new nuclear remain exorbitantly high. Add in the billions it costs to manage waste and build long-term facilities for storing such waste, and it weighs down this technology even more. (3)

The RSE Inquiry took evidence from hundreds of individuals, organisations and businesses across a number of platforms. Its final report into Scotland’s Energy Future also looked at investing in hydrogen and installing many more windfarms to meet its climate goals. It said a massive increase in low-carbon electricity production would be needed in order to reach the country’s new goal of net zero emissions by 2045 – perhaps even a fourfold increase to decarbonise the transport system and heating. Scotland will also need:

- A statutory commission to provide independent expert direction on energy policy and governance;
- Much tougher energy efficiency regulations for homes and buildings;
- Substantial investment in carbon capture and storage,
- Subsidies to ensure higher energy prices and upgrading costs did not increase fuel poverty.

The RSE inquiry was funded by four major energy firms, the oil company BP, the French nuclear and renewables firm EDF, the gas company Centrica and the renewables firm SSE. The RSE said they had no bearing or influence over the report’s conclusions but the report mirrored those companies’ arguments that nuclear energy, oil and gas would still be needed – conclusions many climate and environment activists reject. (4)

The Scottish Government website says:

“We are aware of increasing interest in the development of new nuclear technologies such as Small Modular Reactors. We have a duty to assess this and all other new technologies based on safety, value for consumers, and contribution to Scotland’s low-carbon economy and energy future.” (5)

The Office for Nuclear Regulation and the Environment Agency plan shortly to publish their modernised guidance for developers of SMRs on their Generic Design Assessment, the process through which reactor designs are scrutinised by the regulators prior to further necessary regulatory steps, including site specific assessment and issuing of site licence and environmental permits, to enable subsequent deployment.

A Joint report by Nuclear Consulting Group and Nuclear Free Local Authorities by Steve Thomas, Paul Dorfman, Sean Morris & M V Ramana, looked at the “Prospects for SMRs.” (6) Report after report, usually from the nuclear industry or its supporters, has made grandiose claims for SMRs and their importance in delivering a low carbon future. In the UK, the site of Trawsfynydd in Gwynedd, Wales,

which hosts a former Magnox plant, is being heavily trailed by the industry and the UK and Welsh Governments as being ideal for SMRs. In Canada and the United States, sites have also been put forward. But is this confidence brittle-deep, style over substance, words rather than action? The nuclear industry has put forward SMRs as a panacea to these problems of high cost and the difficulty of financing; a ready-made alternative that can fill the gap. However, Thomas et al outline in detail, there are huge obstacles to overcome. Some of these are technical issues, others are around building up an effective supply chain, while the financing of such schemes will only be possible with significant subsidy from the public purse.

Spending so much time and effort pursuing such an uncertain technology, at a time when the 'climate emergency' has now reached the political and public lexicon in requiring urgent attention, does not appear to be an effective use of taxpayer resources. Abundant evidence shows that renewable energy supply, storage, distribution and management technologies are being developed ever cheaper and swifter at a time when real urgency is required across society and government to mitigate the worst effects of climate change. SMRs are no answer to creating low-carbon economies by 2030 or close to that date. Governments should consider this report carefully and not be diverted by an unproven technology inherent with many difficult issues still to overcome.

Report co-author Professor Steve Thomas says:

"Nuclear proponents are saying that SMRs will be the next big thing – but the reality is they are as expensive as large reactors, produce the same waste, carry the same radiation risks, and are a long way from any real deployment." (7)

1. Scotland's Energy Future, Royal Society of Edinburgh 17th June 2019 http://www.rse.org.uk/wp-content/uploads/2019/06/Energy-Report-for-Web-2.pdf
2. Nuclear Consulting Group 24th June 2019 https://www.nuclearconsult.com/wp/wp-content/uploads/2019/06/Scotland's-Energy-Future-has-no-need-for-Nuclear.pdf
3. The National 7th July 2019 https://www.thenational.scot/news/17754014.experts-slam-39-disingenuous-39-nuclear-reactor-plan-scotland/ and The Ferret 7th July 2019 https://theferret.scot/nuclear-power-reactors-scotland/
4. The National 20th June 2019 https://www.thenational.scot/news/17717293.nuclear-has-no-place-in-scotlands-energy-mix/
5. Guardian 17th June 2019 https://www.theguardian.com/uk-news/2019/jun/17/scotland-urged-to-invest-in-nuclear-to-hit-climate-goal
6. https://www.gov.scot/policies/nuclear-energy/
7. http://www.nuclearpolicy.info/wp/wp-content/uploads/2019/07/Prospects-for-SMRs-report-2.pdf

6. Decarbonising Heat

The Common Weal think-tank has published a new report called “Just Warmth: developing equitable and sustainable district heating systems in Scotland”, by Dr Keith Baker (Glasgow Caledonian University), and Dr Ron Mould – both Co-founders of the Energy Poverty Research initiative. (1)

The report looks at successful projects elsewhere in Europe and shows is that using multi-technology approaches, particularly those combining large scale solar thermal with sustainable biomass and inter-seasonal heat storage and heat recovery technologies, must become a central theme in the future development of district heating in Scotland. (2) The heat supplied by DHS can come from a wide variety of sources, including gas, biogas and biomass boilers, solar thermal panels, energy from waste plants, geothermal sources, heat pumps (which can also be used to provide district cooling), anaerobic digestion plants, and fuel cells. Heat exchangers can also be used to recover waste heat from industrial plants and processes, as well as from losses within a larger DHS; and batteries, boreholes, gravel-lined covered reservoirs, and other technologies can also be used for short-term and inter-seasonal heat storage.

Denmark leads the world in developing sustainable DHS, with major installations combining large-scale solar thermal installations with sustainable biomass and inter-seasonal heat storage. The largest of these are at Dronninglund (26MWth), and Marstal on the island of Aeroe (23MWth), which use gravel-lined covered reservoirs for heat storage, whilst the 13MWth installations at Braedstrup uses boreholes. Indeed, the infrastructure is so ubiquitous that over 60% of households are supplied by DHS, rising to 98% in Copenhagen, where the development of modern local heat networks has been in full swing for over one hundred years. Only Iceland, with its huge geothermal resources, has a higher national penetration of DHS networks (95% of households), whilst Sweden, Finland and Lithuania make up the top five.

Norway is now making significant investments in using solar thermal as part of such combined-technology approaches to designing heat networks. And this multi-technology technology approach is now spreading across Europe, with a significant new development in Graz, Austria.

Denmark now has six large central district heating areas, with a total heat production of approximately 16.7TWh per year. There are also around 400 smaller decentralised district heating areas, supplying an additional 20.8TWh. In 2013, the total production of district heating in Denmark amounted to 37TWh, 72.8% of which was produced in cogeneration with electricity (CHP), saving around 30% of fuel compared with separate generation of heat and power. Scotland plans to have 1.5TWh of heat demand delivered by district or communal heating, with 40,000 homes connected by 2020 representing somewhere between 1 and 2% of demand (which was 82.7TWh in 2012). In Denmark DHS supplies over 60% of heat demand.

In all of the indicative scenarios set out in the UK Clean Growth Strategy, heat networks are projected to meet 17% of heat demand in homes and up to 24% of heat demand in industrial and public-sector buildings by 2050. (3) (Interesting to speculate how things might go after 2020. If demand can be reduced by 20% by 2050 that would bring it down to about 66TWh. 17% of heat

demand by 2050 means 11TWh if Scotland does the same. If you draw a straight line graph that means about 4.5TWh by 2030 and almost 8TWh by 2040.)

The Danish Energy Agency notes that the inclusion of heat storage in all district heating areas has been central to its many successes. It means that cogeneration plants can generate electricity when other renewables are in short supply and store surplus heat for future use. Another critical factor in Denmark's DHS revolution has been the adoption of a succession of Heat Supply Acts (HSAs), beginning as far back as 1979, when local authorities were first required to zone areas for the development of new networks.

Rural Heat

In another report from the Common Weal's entitled "Carbon-Free, Poverty-Free", the authors focus on rural fuel poverty. (4) The joint paper with gas firm Calor, says Danish-style community heat schemes could help lower bills outwith urban areas. However, this solution may only work for 60% of properties and those that cannot be connected could use biogas boilers in conjunction with building-mounted solar generators. More than 90% of rural residents who are income poor are also fuel poor, according to research. This is far higher than in towns and cities and the problem is linked to poor physical and mental health and lower education attainment. It is generally thought that district heating is not a viable option for rural areas, but in rural areas the necessary pipework is easier to install because access is easier. There is no reason district heating cannot supply a solution to much of rural Scotland. (5)

Those is rural fuel poverty who will not be able to replace their old oil boiler will need affordable low-carbon alternatives. Policy responses need to accommodate this otherwise a large section of rural Scotland will remain on fossil fuels or be condemned to higher energy costs (electric heating is the easiest non-carbon heating source to install but is also more or less the most expensive).

Household-mounted solar thermal is cheap to install, cheap to generate and highly flexible – but a standard installation will not meet 100 per cent of heating need (particularly in properties which share a roof) and would require the additional installation of heat storage or for changes in occupants' habits and behaviours. Large-array solar thermal has even more advantages than household-mounted, producing very cheap heating that can be stored and is capable of providing over half of heating requirement – but it requires a district heating system to distribute the heat.

The report reviews heating options and concludes that there will need to be a multiple-technology approach to decarbonising heat everywhere in Scotland. The efficiency of household-level heat pumps is overestimated (though large-scale heat recovery from flooded mineworks or waterways is much more efficient), hydrogen and electricity are too expensive for anything other than niche applications, biogases and various waste options would not be sufficient to meet demand alone and have supply-chain limitations, wood biomass is not suitable for urban areas (and requires a lot of space and coordinated supply chains), and solar thermal is very promising but is generally insufficient to meet one hundred percent of household heating demand (without additional thermal storage or changes in household behaviour). The conclusion here is that by far the best way to decarbonise energy is to use multiple technologies – but to get the most from them they must be

used at scale. This requires a district heating system along the Danish model to distribute centrally generated heat round households.

Stirling District Heating

NICOLA Sturgeon has officially opened a new £6 million renewable energy scheme providing low-cost heat from wastewater. The Stirling District Heat Network is thought to be the first project of its kind in the UK and uses cutting-edge technologies to harness energy from wastewater from the city's sewage works. The £6 million project is being delivered by Stirling Council in partnership with Scottish Water Horizons (SWH). SWH will own and operate the energy centre, located at the existing Stirling Waste Water Treatment Works in Forthside. SWH will sell the heat to Stirling Council at an agreed rate and volume, which the Council will then sell on to users via the heating network. Initially, the network will deliver low-carbon heat to a number of key public buildings, including The Peak Leisure Centre, Forthbank Stadium, St Modan's High School and organisations such as Zero Waste Scotland and Volunteer Scotland. There is scope for the network to also be expanded across the city to include homes, helping tackle fuel poverty and providing savings for businesses. (6)

Geothermal

An innovative project in Glasgow's east end is investigating the potential for untapped mine water to be harnessed as geothermal energy that could be used to help heat up to 180 million homes in the UK. The geothermal research observatory will explore underground mine workings via 12 boreholes drilled to varying depths in Dalmarnock and Rutherglen's Cuningar Loop. The project has been funded by the Natural Environment Research Council (NERC) and the British Geological Survey (BGS) as part of the £31 million UK Geoenergy Observatories Project and is expected to continue for 15 years. It is estimated that a quarter of all UK homes and businesses, some 9m buildings sit on former coalfields. So far, scientists have drilled four boreholes with the remaining eight partially drilled exploratory channels to be completed by autumn this year. The research into Glasgow's geology, its underground water systems and the potential for heat from the water in the city's disused coal mines is expected to provide vital data that could help the UK and other countries access low-cost, low-carbon heating. Measurements will be taken from the underground observatory boreholes such as temperature, water movement and water chemistry over the period. The Coal Authority, which estimates there is enough geothermal energy in coal mines to heat 180m homes, is preparing a map of potential mine water resources in Britain which could be utilised in the future of sustainable energy. (7)

1. Just warmth, by Keith Baker and Ron Mould, Common Weal 12th May 2019 https://commonweal.scot/sites/default/files/2019-05/Just%20Warmth.pdf
2. The National 12th May 2019 https://www.thenational.scot/news/17633939.common-weal-urges-scottish-government-to-adopt-radical-heating-networks/
3. Heat Networks Investment Project, BEIS 2018 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/691643/Heat_Network_Case_Study_Brochure.pdf

4. Dr Keith Baker, Dr Ron Mould, Dr Craig Dalzell, and Jonathon Shafi. Carbon Free : Poverty Free, Common Weal 17th June 2019 https://commonweal.scot/policy-library/carbon-free-poverty-free

5. The National 24th June 2019 https://www.thenational.scot/news/17725040.danish-style-district-heating-projects-could-ease-fuel-poverty/

6. Video: https://www.scottishwater.co.uk/en/About-Us/News-and-Views/070819-First-Minister-at-Stirling-Green-Heat-Project and Stirling Council 7th Aug 2019 https://www.stirling.gov.uk/news/2019/august-2019/stirling-s-pioneering-green-heat-network-gets-seal-of-approval-from-first-minister/

7. Herald 23rd Aug 2019 https://www.heraldscotland.com/news/17855441.glasgow-mine-workings-scheme-lead-heating-180-million-homes/

7. Climate Emergency

More than half the UK's principal councils have now declared a climate emergency, making it one of the fastest growing environmental movements in recent history, according to the Local Government Chronicle (LGC). 205 of the UK's 408 principal authorities (county, unitary, metropolitan, London boroughs, district) have declared a climate emergency, committing them to take urgent action to reduce their carbon emissions at a local level. Earlier this month, the Local Government Association itself declared a climate emergency at its annual general meeting and agreed to establish the Climate Emergency Network to support councils and lobby central government. (1)

To translate declarations into tangible carbon-reduction actions there is a huge question of resources. Paul O'Brien, the Association for Public Service Excellence (Apse's) chief executive says "we will need a real step-up in the resources available to local councils. Climate action matters, but there is a disconnect between what local councils can realistically deliver when resources are being choked by austerity." A new report by Apse says local authorities need to take an organisation-wide response to action on climate issues: from councils' corporate financial strategy to all council services, in particular housing, waste and recycling, transport and infrastructure investment.. (2)

Glasgow & Edinburgh

Glasgow and Edinburgh are in a race to become first major UK city to reach 'net zero'. ScottishPower is working alongside Glasgow City Council and has pledged to make Glasgow the first major UK city to reach "net zero" carbon emissions "well before" 2045. Glasgow's plans include mass charging points for electric vehicles. More than 70% of the city's residents living in flats are unable to charge electric cars as they have no off-street parking. Scottish Power says it is planning a charging system where people can rapidly charge their vehicles away from home - at work or at public charging locations. The Council and Scottish Power say they will work on a range of programmes to help the city reach the target, including the introduction of electric buses. (3)

Edinburgh City Council, on the other hand, says it will be a zero-carbon capital city by 2030. Council leader Adam McVey said: "Cities and towns all over the world are recognising the horrifying scale of the climate change challenge facing us all. We have to act and act fast." (4)

Edinburgh is setting itself a high bar in trying to become carbon neutral by 2037 and setting an even more ambitious interim target for 2030. The plan involves setting up a cross party oversight group on sustainability. It also acknowledges the findings of an independent report by Professor Andrew Kerr which showed that the council needed to be more agile to address all the challenges in areas such as climate, transport and planning. At present the council is committed to reducing emissions by 42% by 2020. Carbon emissions in the city have reduced by over a third since 2005, and the council says it will meet its target by next year. Projects such as the introduction of a Low Emission Zone and also the extension of the tramline to Newhaven are viewed as positives which will reduce emissions further. But the council also recognises that it will be important to engage with the public about these new targets. Some of the ways in which they hope to achieve the goal is by employing measures such as increasing local renewable energy generation on council land and property, and developing low carbon supply chains and a low carbon workforce. (5)

The council says it faces "tough choices" including replacing conventional gas boilers in properties with carbon neutral alternatives. It will also become more difficult to access the city centre by car with priority given to cyclists, pedestrians and those using public transport. Freight hubs could also be set up outside the city - allowing for low carbon alternatives to bring goods into the Capital. (6)

D4 for energy - decarbonise, decentralise, digitalise and democratise.

As the energy system begins to decarbonise, decentralise and digitalise we should be thinking about how it can be democratised as well. If we are to make sure the energy transformation is democratic we need to engage people in the process. Simon Roberts of the Centre for Sustainable Energy in Bristol talks about the need for ‘meaningful public consent’. If you think about the scale of change that is going to be needed to meet carbon objectives then we need more or less everyone in society to change the way they use energy, and ultimately the public is going to have to pay for the changes through bills and taxes. If we haven’t got meaningful public consent for all of the change, then we are not going to be able to achieve it. People need to understand what is going to be happening, feeling comfortable with that and possibly even being involved in a process which came to conclusions about what needed to happen. People will want to know, in particular, that changes are being implemented in a fair way. The Centre for Sustainable Energy believes this needs to be done at a local level. It has found that if you bring a group of people together in a locality and ask them ‘how they are going to make a contribution to the changes that need to happen’ they come up with sensible answers. The conversations need to start outside of any specific proposals. Start by asking people what they value about the place they live in. What is it that needs to be taken into account as we think about how it will change.

We also need to ensure equality as we transform our energy systems. If the transformation leaves people behind it will get rejected – there won’t be meaningful public consent. If it’s not fair it won’t happen. We need to think about how we can ensure that people on low incomes can also achieve the benefits which the energy transformation is going to offer and protect them from some of the disadvantages that might emerge. For example, under the current arrangements we will all have to help fund the reinforcement required to our local area network for the wealthy Tesla car owner. As we transform the system there will be new ways of generating unfairness. But at the same time we don’t want to stifle innovation. (7)

Citizens' Assembly

Meanwhile, Britain's first climate assembly, convened by Camden council, has agreed on 17 proposals for action to tackle the climate crisis, including installing solar panels on all available roofs and cutting fossil fuels out of local government developments. The assembly brought together more than 50 residents, randomly selected, and a team of climate experts to develop proposals that could be taken up by the council to reduce carbon emissions and increase sustainability. The proposals focused on housing, transport and green space, and included a community energy scheme to remove fossil fuels from home heating, widespread cycle lanes and car-free zones, and programmes to ensure that all new homes in Camden are built carbon-neutral. (8)

A national climate assembly is planned for Westminster this autumn and Camden is being closely watched for the dos and don'ts of this relatively new form of public engagement. (9)

Climate Emergency Response Group (CERG)

A ban on fossil fuel vehicles in city centres by 2030 should be one of the Scottish government's key policies, according to a group of civic leaders. The Climate Emergency Response Group has set out a 12-point-plan of measures it wants the government to consider. It includes calls for four new Green City Region Deals and a £100m fund for modernising agriculture. Ministers have said the climate emergency will be at the heart of next month's programme for government. The group behind the environmental action plan is made up of 19 organisations. It also says public guidance should be produced on sustainable, climate friendly and healthy diets. And it calls for a public-interest company to be created by the Scottish government to invest in and support carbon capture and storage infrastructure. Using a similar model to Network Rail, it would allow the government to take a longer term view than a privately financed model. The report's authors insist all 12 suggestions could be implemented within the next year.

The other organisations supporting CERG are Climate-KIC, Confor, Energy Saving Trust, Everwarm, Jacobs, Locogen, NHS National Services Scotland, Scottish Council for Development and Industry, Scottish Land & Estates, Sustainable Scotland Network, Star Renewable Energy, Sunamp Heat Batteries, Sustrans, University of Edinburgh, Vegware, WWF Scotland and 2050 Climate Group. (10)

1. Local Government Chronicle 31st July 2019 https://www.lgcplus.com/services/environment/exclusive-50-declare-climate-emergency-31-07-2019/
2. Guardian 10th July 2019 https://www.theguardian.com/society/2019/jul/10/climate-crisis-can-councils-deliver-bold-pledges
3. BBC 15th May 2019 https://www.bbc.co.uk/news/uk-scotland-48269986
4. Telegraph 15th May 2019 https://www.telegraph.co.uk/business/2019/05/14/glasgow-become-first-major-uk-city-reach-net-zero/
5. Edinburgh Reporter 13th May 2019 https://www.theedinburghreporter.co.uk/2019/05/can-edinburgh-become-carbon-neutral-by-2037/
6. BBC 15th May 2019 https://www.bbc.co.uk/news/uk-scotland-48269986

7. Future Learn: transforming energy systems https://www.futurelearn.com/courses/transforming-energy-systems/1/todo/49736
8. Guardian 21st July 2019 https://www.theguardian.com/world/2019/jul/21/britains-first-climate-assembly-agrees-plan-for-council-to-tackle-crisis
9. Guardian 19th July 2019 https://www.theguardian.com/world/2019/jul/19/could-camdens-climate-assembly-help-fix-democracy-too
10. WWF Scotland 26th Aug 2019 https://www.wwf.org.uk/updates/twelve-point-plan-tackle-scotlands-climate-emergency

8. Offshore Wind & Scottish Jobs

Unions are campaigning to persuade energy companies to use local Scottish firms like BiFab, but the way licences are awarded by government is leading to some ridiculous decisions such as carrying out most of the steelwork for one windfarm in Indonesia, rather than the mothballed BiFab yards in Burntisland and Methil.

A study Friends of the Earth Scotland were involved with suggested the potential for three times as many jobs in the zero-carbon energy sector as in oil extraction, plus the jobs that will be sustained for a couple of decades in decommissioning North Sea oil infrastructure. But we are already beginning to see that the market does not deliver them in the right places.

Almost all of the major steelwork for the £2 billion Neart na Goaithe offshore windfarm off the Fife coast is to be fabricated in Indonesia, rather than at the BiFab yards in Burntisland and Methil that are sitting idle. These yards are about 40 miles from the site of the windfarm; Indonesia is more than 7,000 miles away. This is a crazy decision in environmental and social terms.

GMB, Unite the Union and the STUC have set up a campaign, supported by Friends of the Earth to try to get EDF to make a different decision. Other companies are doing only a little better. Scottish Power has an even larger offshore windfarm in East Anglia. About a quarter of the major steelwork is coming from the UK, but more than half is coming from the UAE.

Why are we relying on the goodwill of companies to decide how much largesse they will bestow upon the UK? It is the UK and Scottish governments which control the many licences and permits needed to construct offshore windfarms, and decide which go ahead and which do not. To make the Just Transition real, both governments need to urgently use their powers to create zero-carbon jobs at home. (1)

Former UK Energy Minister, Brian Wilson, says SNP Ministers should be sacked over the scandal. (2)

Labour MSPs in Fife are demanding answers from ministers over the “complete lack of preparedness” to win work from the NnG wind farm. Claire Baker and Alex Rowley have asked why no assurances were sought from the developer behind the project during a two-year period when the Scottish Government was involved in court cases with the Royal Society for the Protection of Birds. Unions have complained the nearby Methil yard owned by Scottish Enterprise and also the

BiFab Burntisland yard, which is part of Forth Ports, missed out on the work despite lying empty. They also want “full information” on public investment over the past decade in both yards. (3)

Meanwhile, the largest offshore wind farm in Scotland, and the fourth largest in the world, has been officially opened at a ceremony in Wick attended by Prince Charles. Developer SSE said the £2.65bn Beatrice wind farm boasts 84 turbines, 588MW of capacity, and has the potential to power up to 450,000 homes. (4)

Gary Smith of the GMB wrote: Today in Methil a skeleton staff of 40 people work on a catch-up programme for turbine pins, while Burntisland remains shut. There is the prospect of a further 200 jobs through a contract for eight turbine jackets from the £2 billion NnG wind farm, but the truth is it’s a paltry return as 85 per cent of those jackets will be built in Indonesia. It’s the same old story as the bulk of jobs and prosperity go elsewhere. So as the bunting blows in the Caithness wind, the Scottish Renewables lobby and every politician that promised us a green jobs revolution should not be congratulating themselves. Instead they should be cringing that we are getting so badly rinsed. It’s an inconvenient truth for some but what’s happening in our renewables manufacturing sector is a national humiliation. (5)

Changes proposed to offshore wind leasing by the UK Crown Estate have angered the GMB, which has warned its Scottish counterpart that it should be telling developers north of the border: “no jobs, no lease”. Crown Estate Scotland is a separate body which has yet to publish the rules that will govern future leasing. GMB says they need to “start challenging” developers on jobs. A Crown Estate Scotland spokesperson said the organisation was “working hard” to ensure that its leasing round, called ScotWind, will “enable wider socio-economic benefits for communities”. The UK Crown Estate announced last month it will make alterations to the next Offshore Wind Leasing Round in England, Wales and Northern Ireland in response to feedback from developers. (6)

An alliance aimed at ensuring local companies benefit from a £20 billion investment in offshore wind farms has been hailed an “exciting step forward” for Fife. Fife Council has signed up to the Forth and Tay Offshore Wind Cluster, a group involving local authorities, renewable energy industry leaders and Scottish Enterprise. It has agreed to contribute £10,000 towards developing an action plan that could bring significant rewards to engineering and energy companies across the region, including the mothballed BiFab yards in Methil and Burntisland. Dundee City, Angus and Perth and Kinross councils are expected to match the funding as they too join the cluster. The idea is to develop an in-depth understanding of businesses in the cluster area capable of supplying the rapidly-developing offshore wind sector and promoting them to key industry players, including EDF Energy, SSE Renewables and Red Rock Power Limited. The three energy giants are planning separate major wind farm developments in the Firth of Forth and Tay. (7)

1. Scotsman 28th May 2019 https://www.scotsman.com/news/opinion/columnists/why-are-scottish-windfarms-being-built-7-000-miles-away-instead-of-fife-dr-richard-dixon-1-4935710
2. Scotsman 7th July 2019 https://www.scotsman.com/news/opinion/columnists/brian-wilson-fife-offshore-windfarm-scandal-should-see-snp-ministers-sacked-1-4959930

3. Scotsman 19th July 2019 https://www.scotsman.com/news/environment/snp-ministers-under-fire-over-wind-farm-deals-1-4967622

4. STV 29th July 2019 https://stv.tv/news/north/1439592-prince-charles-to-open-scotland-s-largest-offshore-wind-farm/

5. Herald 30th July 2019 https://www.heraldscotland.com/opinion/17803033.scots-let-green-jobs-39-revolution-39/

6. Energy Voice 12th Aug 2019 https://www.energyvoice.com/otherenergy/205294/crown-estate-scotland-should-be-telling-wind-developers-no-jobs-no-lease-union-says/

7. Dundee Courier 21st Aug 2019 https://www.thecourier.co.uk/fp/news/local/fife/961104/new-group-to-ensure-fife-firms-benefit-from-20bn-windfarm-investment/

9. Onshore Wind

Pressure is mounting within the Conservative party to end its block on new onshore windfarms after evidence that Tory supporters overwhelmingly back their return. Boris Johnson is facing internal calls to give the green light to new onshore wind projects that could slash the price of energy. Latest research suggests Tory voters are far more concerned about fracking than they are about onshore windfarms. Polling of more than 15,000 Tory voters suggests there is now clear support for onshore wind farms. Onshore wind is currently excluded from competing in Contracts for Difference auctions, which are designed to provide stability and certainty to investors. The exclusion has been blamed for stopping further investment. (1)

Claire Mack, chief executive of Scottish Renewables, is also calling for the removal of the unnecessary ban on new onshore wind and solar PV competing in low-carbon energy auctions, She adds: “Similarly, acting fast to prevent a significant investment hiatus in low-carbon heat projects around the end of the Renewable Heat Incentive in 2021 will be crucial to meeting UK and Scottish climate targets over the next decade, and should be an absolutely fundamental step as the new Prime Minister begins to consider a low-carbon, smart energy policy which will be fit for the future.” (2)

Some onshore wind developments do manage to go ahead by agreeing power purchase agreements. Bristol Energy, for instance, has just agreed to buy electricity from two onshore wind farms – one in Aberdeenshire and one in Suffolk – a total capacity of 3.6MW. The deal was completed on e-Power, an online auction that enables independent renewable energy generators to sell green electricity to utilities. Simon Proctor, renewables and origination manager at Bristol Energy, said: “This deal is an important part of our purpose to create a sustainable energy company, which has social value at its heart.” (3)

In theory onshore wind turbines across Europe could technically provide the continent with more than 10 times its existing electricity needs. (4)

Overall, renewable energy generation hit an all-time record in Scotland last year, at the equivalent of three quarters of gross consumption. The UK Government measured overall output at 26,708

gigawatt hours (GWh) – a six per cent increase on the previous record set in 2017. Electricity output at such a level represents the equivalent of powering all households in the country for more than two-and-a-half years.

The upbeat numbers, however, do not tell the whole story. Scottish Power, for example, believes Scotland will have to quadruple renewables output to replace fossil fuels being burned for transport and heating. Scotland has Europe's worst record on renewable heat. New figures reveal that, despite an excellent record on clean electricity, the country remains dangerously dependent on climate-changing gas in order to stay warm. Only 6% of all heating in Scotland is sustainable – just one tenth of the proportion in Sweden, the best performing nation in the EU-28. Scotland is close to the top of the EU league table for renewable electricity but right at the bottom for renewable heat. Combined with transport, this means an overall rate of renewable energy slightly above average, at around one fifth. Scotland's central heating systems are usually gas-fired and a race is on to provide simple solutions to enable householders to replace their current boilers – as and when they are due for an upgrade – with electric ones. (5)

1. Observer 30th June 2019 https://www.theguardian.com/environment/2019/jun/30/tories-urge-lifting-off-onshore-windfarm-ban
2. Herald 26th July 2019 https://www.heraldscotland.com/news/17795728.green-campaigners-put-heat-new-pm-boris-johnson/
3. Scotsman 23rd July 2019 https://www.scotsman.com/business/scots-wind-farm-part-of-deal-to-power-3-000-uk-homes-1-4969301
4. Carbon Brief 5th July 2019 https://www.carbonbrief.org/europe-could-get-10-times-its-electricity-needs-from-onshore-wind-study-says
5. Herald 15th July 2019 https://www.heraldscotland.com/news/17770067.wind-heat-scottish-homes-millions-england/

10. Submarines

A bill to speed up the dismantling of redundant nuclear submarines, including vessels at Rosyth, is being introduced through parliament. Fife SNP MP Douglas Chapman has joined forces with the Labour MP for Plymouth Devonport, Luke Pollard, and Berwick on Tweed Conservative MP Anne-Marie Trevelyan to put forward a bill will seeking to get the ageing subs currently languishing in dockyards around the country defuelled and dismantled more quickly. The bill will also oblige the Westminster government to produce an annual report on its progress. The introduction follows a damning National Audit Office report earlier this year into the government's process on dismantling submarines which were decommissioned decades ago but have been sitting idly in docks like Rosyth.

The Ministry of Defence has not disposed of any of the 20 boats decommissioned since the 1980s. While all seven subs at Rosyth have been defuelled, nine of the others still contain nuclear fuel, which makes the risk level in Plymouth much higher. The public accounts committee, of which Mr

Chapman is a member, recently estimated that keeping the submarines in storage was costing British taxpayers £30 million a year.

Due to a lack of parliamentary time, which equates to a failure of the Government to give this issue sufficient priority, it looks unlikely that the Bill will ever pass into law.

Devonport is home to 13 retired submarines – some of which were removed from service almost 30 years ago. Now the MoD wants to get permission to store four more unwanted nuclear subs in the city. (3)

The Public Accounts Committee (PAC) report says the "glacial pace" and a "15-year delay" to the process of decommissioning Britain's scrapped nuclear submarines "has led to extortionate storage and maintenance costs". The PAC report strongly criticised the MoD for failing to dispose of 20 submarines dating back to 1980. Much of the blame lies with poor contractor performance and a lack of money, the report says. The date for the first submarine to be dismantled, Swiftsure, has been put back three years to 2026 and the report warns that the MoD will run out of space for both storing and maintaining submarines if it fails to re-start submarine defueling, which has been suspended since 2004, in 2024. Seven of Britain's decommissioned nuclear submarines have been in storage for longer than they were in service. The UK now has twice as many submarines mothballed than operational. The report criticised the decision by the MoD to defer infrastructure work at Devonport to save £19 million in the short-term, which then delayed the defueling project by two years. The MoD is not yet able to confirm how much it will cost to complete the project. However, the report did highlight the opportunity to develop much needed engineering skills in the nuclear sector and called on the MoD and Babcock, the prime contractor, to work with universities to increase the size of the skilled workforce across the country. (4)

1. Dundee Courier 27th July 2019 https://www.thecourier.co.uk/fp/news/local/fife/943926/cross-party-support-for-bill-to-speed-up-removal-of-rosyths-nuclear-submarine-fleet/ and Dundee Courier 12th July 2019 https://www.thecourier.co.uk/fp/news/local/fife/933436/dunfermline-mp-on-fact-finding-mission-to-devonport-as-campaign-to-speed-up-removal-of-nuclear-subs-gathers-pace/
2. Plymouth Herald 20th June 2019 https://www.plymouthherald.co.uk/news/news-opinion/storing-nuclear-subs-cant-go-2996832
3. Plymouth Herald 22nd June 2019 https://www.plymouthherald.co.uk/news/plymouth-news/gallery/plymouths-nuclear-submarines-through-years-3003115
4. Telegraph 18th June 2019 https://www.telegraph.co.uk/news/2019/06/18/scrapped-submarines-costing-30m-year-extortionate-storage-costs/

11. Island Energy

The Western Isles and Skye are to be used for a pilot project aiming to make a fundamental change in how electricity is distributed in Scotland. Scottish and Southern Electricity Networks (SSEN) is planning to use local generators on the islands as part of the "modern electricity grid of the future".

SSEN is working with smart energy software Piclo, a platform designed by Open Utility. Open Utility announced nearly half a million in funding from Business, Energy and Industrial Strategy (BEIS) department's Energy Entrepreneur fund to develop it new online marketplace in 2017. The plans will look to move away from using power from dirty diesel generators during maintenance or a fault and switch to cleaner wind or hydro power. SSEN will also look to involve a number of local businesses in the project. If successful, it could mean cheaper energy bills for customers as SSE pay local generators to export during times of need. The energy distribution will be managed by Open Utility's peer-to-peer energy flexibility platform. (1) SSEN says the initiative in the Western Isles and Skye will be a significant step in developing the flexible network of the future. (2)

Hydrogen

Wind energy produced in the Outer Hebrides could be used to power ferry services to the islands and bring major economic benefits to their people, according to a major new study published by Point and Sandwick Trust. Wind power could be used to make green hydrogen that would replace emission-heavy marine oil on established Caledonian MacBrayne routes. It could open up a new home grown market for island renewables, which have struggled in the past to keep good connections to the grid. (3) The project looked at the practical and economic feasibility of using new island wind farms to produce hydrogen fuel. The group worked with industry professionals including Wood, Siemens-Gamesa, Engie, ITM, CMAL, Johnston Carmichael and Ferguson Marine to compile the report. Although trials elsewhere have used surplus electricity to drive small ferries, this does not reflect the full economic cost of switching from marine oil to hydrogen. The Western Isles study is the first to look at the feasibility of using electricity derived from a local wind farm built specifically to power shipping on existing and established ferry routes. (4)

1. Energy Voice 9th Aug 2019 https://www.energyvoice.com/otherenergy/205250/sse-looks-to-scottish-islands-to-change-energy-distribution/
2. The National 9th Aug 2019 https://www.thenational.scot/news/17825672.islands-play-key-role-electricity-revolution/
3. Scotsman 30th July 2019 https://www.scotsman.com/heritage/wind-power-generated-in-outer-hebrides-could-power-ferry-services-to-islands-1-4973991
4. Press & Journal 30th July 2019 https://www.pressandjournal.co.uk/fp/news/islands/western-isles/1808108/hydrogen-fuelled-ferries-considered-for-western-isles/

12. Dundee – EVs

Dundee has the largest number of electric minicabs anywhere in the UK (134 at the last count), a council-owned network of four solar-powered charging hubs capable of taking 78 cars at a time (with sites for another 60 being built) and the highest number of rapid chargers of any Scottish city.

Fraser Crichton, the council's fleet operations manager, is in charge of the strategy. "My ambition is to make Dundee fully electric within 15 years, which is my working lifetime," he said. "I want my city to be the cleanest in the UK." Dundee city council believes it has the UK's largest local authority electrified fleet, with 117 electric cars and vans in use. It plans to buy 65 more, replacing its highly polluting diesel bin lorries and road sweepers with electric vehicles, and running subsidised electric minibuses in some of its poorest neighbourhoods.

Scotland's drivers have been slow to take up electric vehicles. Official sales figures show that while Scotland has 8.5% of the UK's population, only 5.8% of the UK's ultra-low-emission cars are registered in Scotland. That's 11,607, out of a total of 2.5m cars. Meanwhile, bus use has been in long-term decline and CO2 emissions from transport continue to grow. Environment campaigners welcome the shift to electric vehicles, but John Lauder, the deputy chief executive of the sustainable travel charity Sustrans, said far greater effort was needed to cut overall private car use, not just to switch from fossil fuels. "Electric vehicles are not always carbon neutral, they will not tackle congestion in our towns and cities, they will not improve road safety and they will do nothing to deal with the obesity crisis facing Scotland," he said.

Guardian 16th Aug 2019 https://www.theguardian.com/uk-news/2019/aug/16/dundee-green-revolution-charging-hubs-electric-cabs-scotland